INSERT PIECE FOR A CONTAINER HOLDING A LIQUID WHICH IS TO BE HEATED OR COOLED, CONTAINER HAVING AN INSERT PIECE OF THIS NATURE, AND PROCESS FOR FORMING AN INSERT PIECE

The invention relates to an insert piece for a container holding a product which is to be heated or cooled, which insert piece defines a substantially elongate space which is intended to accommodate a heating or cooling means, the insert piece having a peripheral wall with a closed end and an open end, which open end is provided with an outwardly projecting rim for attaching to the container, the peripheral wall comprising different sections. The invention also relates to a container provided with an insert piece of this nature, and to a process for forming such an insert piece.

A container for drinks having an insert piece containing a heating means or a cooling means in order to enable the drink to be heated or cooled is known. It can be used, for example, to consume hot coffee at any desired location. For this purpose, the insert piece is usually attached to the base of a can, after which the can is filled with coffee, a lid is fitted to the filled can and the coffee is sterilized. Then, usually an insert is placed into the insert piece, which insert holds, for example, a compartment containing water and a separate compartment containing unslaked lime. As a result of the partition between water and lime being perforated or removed in some other way, the unslaked lime reacts with the water in an exothermic reaction which releases sufficient heat to heat the coffee to a desired temperature. The container may also hold food or some other product.

A container of this type is known, for example, from American patent 3,802,056. This document shows a container with an insert piece which is folded around the bottom edge of a drinks can, with a second insert piece, which holds a product which releases an exothermic or endothermic reaction at a desired moment, positioned inside the first insert piece. According to one embodiment, both insert pieces have a conical section which runs from their open end into a cylindrical section and, via a bevel, merges into a cylindrical section of smaller diameter.

Preferably, use is made of a standard size of drinks can in which there is sufficient space for at least 200 ml of drink and an insert piece with a volume of approximately 100 ml.

To optimize the heat transfer from the heating means to the drink, the surface of the insert piece has to be as large as possible. On the other hand, it is desirable for the production costs to be as low as possible, and consequently it is desirable for the amount of material used for the insert piece to be as small as possible. Both requirements result, inter alia, in an aim to keep the thickness of the material of the

insert piece as small as possible, so that the heat transfer per unit surface area is as high as possible.

In many cases, a drinks can is filled under pressure or a filled drinks can is subjected to a sterilization treatment. In both cases, the insert piece has to be able to withstand the pressure exerted on it without the walls being plastically deformed.

One drawback of the container which is known from American patent 3,802,056 is that the heat transfer in this container is relatively poor, since two insert pieces which have been pushed into one another are used. The use of two insert pieces also makes this container relatively expensive.

One object of the invention is to provide an improved insert piece.

Another object of the invention is to provide an insert piece which is as thin as possible without the walls being plastically deformed when pressure is applied to the insert piece.

Yet another object is to provide an insert piece which is optimal both in terms of production and in terms of heat transfer.

Yet another object is to provide an insert piece which can be used as a single insert piece in the container.

According to a first aspect of the invention, one or more of these objects are achieved with an insert piece of the type described in the preamble in which each section of the peripheral wall has a wall section of substantially constant diameter, and in which two adjacent sections are connected to one another by an annular transition which is substantially perpendicular to the wall sections.

This allows the insert piece to obtain a maximum level of rigidity for a given wall thickness, so that to obtain a required level of rigidity the thinnest possible wall thickness can be selected without the insert piece being deformed under the pressure required. This rigidity is produced in particular by the annular transitions. In addition, the sections of constant diameter offer the maximum possible surface area for the volume. Also, an annular transition is eminently suitable for absorbing a certain deformation in the longitudinal direction of the insert piece without the wall sections being plastically deformed.

The peripheral wall preferably comprises two sections of different diameters. In view of the length of a standard drinks can, two sections are sufficient to provide the insert piece with sufficient rigidity while the wall can be made sufficiently thin, and an insert piece comprising two sections is most favorable in terms of production.

Preferably, the section which adjoins the closed end of the insert piece has a smaller diameter than the diameter of the section which adjoins the open end. This design makes the insert piece easy to produce. Also, a space is formed between the insert piece and the wall of the container in which the insert piece is arranged, which is

greater at the closed end of the insert piece than at the section of the insert piece which is attached to the container. This design at any rate means that there is no space in the section of the container which is filled with product which is more or less separate from the remainder of the contents of the container and in which the product remains more or less enclosed. When a product is heated from the insert piece, the product in a separate space may begin to boil. Boiling of the product is undesirable, since this can cause the quality of the product to deteriorate and since the heat transfer to the product is significantly reduced. Also, the remainder of the product remains insufficiently heated. In the case of cooling of a product, ice may form in a separate section, while the remainder of the product remains insufficiently cooled. In other words, the shape according to the invention is such that there is minimum possible disruption to the convection along the insert piece.

The insert piece is preferably made from packaging steel. Steel is a relatively inexpensive material which is easy to process so as to obtain the desired shape of the insert piece. However, other materials, such as aluminum, could also be used if appropriate.

The packaging steel is preferably coated with plastic. This provides protection against corrosion and also against the product in the container being affected by the packaging steel.

According to a preferred embodiment, the insert piece is produced by deep-drawing. Deep-drawing is a very suitable way of producing a product having the shape of the insert piece, since elongate products with a closed end are easy to produce by deep-drawing. A peripheral wall comprising wall sections of constant diameter with annular transitions can be produced in a few deep-drawing steps with, at the same time, the section having the closed end being of a smaller diameter than the section having the open end.

According to a second aspect of the invention, a container for a product to be heated or cooled is provided, the container being provided, according to the invention, with an insert piece as described above.

A third aspect of the invention provides a process for forming an insert piece for a container for a product which is to be heated or cooled, which insert piece is used to accommodate a heating or cooling means, and which insert piece is of elongate form with a peripheral wall and an open end and a closed end. According to the invention, the insert piece is produced by deep-drawing in at least two deep-drawing steps, in such a manner that the peripheral wall of the insert piece is composed of two sections of different diameters.

The result is a process which makes it easy to produce an insert piece which is as rigid as possible.

Although the above text has primarily spoken of a drinks can holding a drink which is to be heated, it will be clear that the insert piece according to the invention is suitable for accommodating either a heating means or a cooling means, that the product to be heated or cooled may be either a drink, a foodstuff or some other type of product, and that the container, besides being a drinks can, may also be a different type of container.

The invention will be explained on the basis of an exemplary embodiment and with reference to the drawing.

The only figure shows a cross section through an insert piece according to the invention.

The insert piece 1 has a closed top end 2, a first wall section 3, an annular transition section 4 to a second wall section 5 and an outwardly projecting rim 6, the outer rim section 7 of which is provided for attachment to a container with an opening through which the insert piece fits.

The insert piece is produced by the deep-drawing of a blank of packaging steel which, in one embodiment, is coated with plastic. To produce the top and bottom sections, the deep-drawing is carried out in a number of steps, in which firstly the bottom section 5 and then the top section 3 is deep-drawn. If appropriate, the projecting rim 6 is formed in a separate step which is carried out in a conventional way.

The annular transition section 4 connects the top section 3 to the bottom section 5. This ring 4 imparts additional rigidity to the insert piece halfway up its height. In the event of an excess pressure being applied in a drinks can during filling under pressure or during pasteurization or sterilization, the wall section 3, 5 of the insert piece will be placed under pressure from outside. Without the ring 4, the height of the wall section is such that the wall section buckles if the material of the wall is too thin. The annular section 4 which is provided according to the invention in fact divides the total height into two halves which, on account of their lower (half) height, will buckle less readily, so that a thinner material can be used.

The annular section 4 itself may serve as a type of cup spring and can absorb a certain deformation in the longitudinal direction of the insert piece. However, in the event of an excess pressure it will be the top end 2 which buckles first.

It will be understood that the exemplary embodiment described above in no way limits the invention. The scope of protection is defined by the claims which follow.